Wisconsin
Department of Commerce

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Environmental & Regulatory Services Division
Bureau of Storage Tank Regulation
201 West Washington Avenue
P.O. Box 7837
Madison, WI 53707-7837

Wisconsin COMM 10 Material Approval

Equipment Alert 1000, 1000-X and 4000 Tank Tightness Testing Methods and Alert 1050 and 1050-X Ullage Tightness Testing Methods

Manufacturer Alert Technologies
5410 Newport Drive Suites 43-44
Rolling Meadows, Illinois 60005

Expiration of Approval: December 31, 2005

SCOPE OF EVALUATION

The Alert 1000, 1000-X and 4000 tank test methods and Alert 1050 and 1050-X ullage test methods, manufactured by Alert Technologies have been evaluated for use as tank testing systems complying with **s. COMM 10.61 (3)** of the current edition of the Wisconsin Flammable and Combustible Liquids Code.

DESCRIPTION AND USE

The Alert 1000-X and Alert 1050-X are similar to the Alert 1000 and 1050 except that the Alert 1000-X and 1050-X have revised software and test procedures that allow an extended range of applicability.

Alert 1000 and 1000-X Test Systems

Alert 1000 and 1000-X are volumetric tank tightness testing methods, which directly measure change in product mass by detecting changes in the buoyancy of a probe. The Alert 1000 and 1000-X tests the tank for leaks below the liquid level only. The systems may be used for tanks containing gasoline, diesel fuel, aviation fuel, fuel oil #4, solvents, waste oil, water, ethylene glycol and other chemicals that will not attack the probe or instruments.

The systems do not detect the presence of water in the bottom of the tank. An inflow of water would be measured as an increase of product. The level of groundwater is to be determined by an observation well near the tank. The test procedure corrects for interference due to the presence of groundwater levels above the tank bottom by calculation of differential pressure from measured water table. Product level is then adjusted for the test. The differential must exceed 0.3 psi.

Tank deformation effects are addressed by beginning the test only when data trends indicate that the tank is stabilized.

Leak rates are calculated using the last data determined to be valid per statistical analysis. A threshold value of 0.05 gallon per hour is used to declare that a tank is leaking below the product level. Test results are considered inconclusive if there is too much variability in the data or if there is an unexplained product volume increase. The test should not be conducted if the groundwater is in hydrostatic equilibrium with the product in the tank.

Lengthening the duration of the test beyond the minimum is an acceptable deviation in the standard test protocol. The total time required for a test with these methods, including equipment set up, data collection and equipment removal, is 5 to 12 hours.

Alert 4000 Test System

The Alert 4000 is a volumetric tank tightness testing method which directly measures change in product mass by detecting changes in the buoyancy of a probe. The Alert 4000 tests the tank for leaks below the liquid level only. The system may be used for tanks containing gasoline, diesel fuel, aviation fuel, fuel oil #4 and #6, solvents, waste oil, and other chemicals that will not attack the probe or instruments.

The Alert 4000 collects increments of data while the tank is in service between periods of pumping activity. Because the Alert 4000 test will only be valid for portions of the tank that are below the liquid level during the test period, and ullage test is performed immediately after the Alert 4000 test to evaluate non-wetted portions of the tank. Product is not added to the tank during the test period.

Alert 4000 does not detect the presence of water in the bottom of the tank. An inflow of water would be measured as an increase in product. The level of groundwater is to be determined by an observation well near the tank. The test procedure corrects for

interference due to the presence of ground water levels above the tank bottom by testing at multiple products levels.

Tank deformation effects are addressed by beginning the test only when data trends indicate that the tank is stabilized.

Leak rates are calculated using the data from the last data determined to be valid per statistical analysis. A threshold value of 0.05 gallon per hour is used to declare that a tank is leaking below the product level. Test results are considered inconclusive if there is too much variability in the data or if there is an unexplained product volume increase. The test should not be conducted if the groundwater is in hydrostatic equilibrium with the product in the tank.

Lengthening the duration of the test beyond the minimum is an acceptable deviation in the standard test protocol. The total time required for a test with these methods, including equipment set up, data collection and equipment removal, is 24 hours.

Alert 1050 and 1050-X Ullage Test Systems

The Alert 1050 and 1050-X systems test tanks for leaks in the non-wetted portion of the tank (ullage). The Alert 1050 and 1050-X must be used with other test methods such as the Alert 1000 or 1000-X to test the tank below liquid level, or the tank must be completely cleaned of product. Leaks are identified by characteristic acoustical signals. Leaks are declared by the presence of increased noise level or ambient pressure in band widths detectable by the system transducer. The Alert 1050 and 1050-X are not affected by product temperature.

If the Alert 1050 or 1050-X is used alone to test an empty tank, the tank must be cleaned of all product, liquid, sludge and waste by a certified cleaner. Documentation from the certified cleaner must be provided when test results are submitted for review. If the tank had never been filled with product, the owner must provide a statement to that affect with test results submitted for review.

Alert 1050 and 1050-X test results will be inconclusive if there is high transient or background noise above thresholds specified by the manufacturer. Interference may be produced by vibration from nearby equipment or dripping condensation. Testing should be conducted only when zero pressure produces a flat line response. Tests should not be conducted if the tank is incapable of holding the test pressure. There are no acceptable deviations in the test protocol.

TESTS AND RESULTS

The performance of the Alert 1000 and the Alert 1000-X was determined in accordance with the EPA protocol for volumetric tank testing methods. The Alert 1000 was found to have a probability of false alarm ($P_{(FA)}$) of less than five percent. The probability of detection ($P_{(D)}$) of a 0.10 gallon per hour leak was found to be at least

95.5 percent. The Alert 1000-X was found to have a $P_{(FA)}$ of 2.7 percent and $P_{(D)}$ of 97.3 percent. The $P_{(D)}$ and $P_{(FA)}$ will vary with tank size and test time.
The performance of Alert 4000 was determined in accordance with the EPA protocol for volumetric tank testing methods which was modified to create an alternate evaluation procedure as allowed by the protocol. The Alert 4000 was found to be capable of detecting a leak below liquid level of 0.05 gallon per hour with $P_{(FA)}$ of 3.7 percent. The $P_{(D)}$ of a 0.10 gallon per hour leak was found to be 96.3 percent.

The performance of the Alert 1050 and 1050-X was determined in accordance with the EPA protocol for non-volumetric tank testing methods. The Alert 1050 and 1050-X were found to be capable of detecting a leak in the ullage with a $P_{(FA)}$ of 0 percent. The corresponding $P_{(D)}$ of 0.10 gallon per hour leak was found to be 100 percent.

The EPA test procedures only addressed the issue of the method's ability to detect leaks and not for safety hazards.

LIMITATIONS OF APPROVAL

Procedures specified by the manufacturer shall be used to install and maintain all equipment and to conduct all tests.

Used alone, the Alert 1000 and 1000-X tank test systems are approved for use as methods of tank tightness testing specified in **s. COMM 10.61 (3)** for tanks at least 95 percent full.

The Alert 1000 system may be combined with the Alert 1050 or 1050-X ullage test systems to test tanks that are at least 60 percent full but not more than 95 percent full. The combined systems meet the requirements of **s. COMM 10.61 (3)**.

The Alert 1000-X system may be combined with the Alert 1050 or 1050-X ullage test systems to test tanks that are at least 20 percent full but no more than 95 percent full. The combined systems meet the requirements of **s. COMM 10.61 (3)**.

The Alert 1000 and 1000-X are approved for tank sizes no larger than 30,000 gallons. The Alert 1050 is approved for use on ullage spaces no larger than 8,000 gallons and tanks of up to 8,000 gallons containing no product. The Alert 1050-X is approved for use on ullage spaces no larger than 24,000 gallons and tanks of up to 24,000 gallons containing no product.

For the Alert 1000, the difference between the temperature of added product and in-tank product shall be no greater than + or - 8.90°F for tanks of 15,000 gallons or less and no greater than for + or -22.9°F for tanks over 15,000 gallons. For the Alert 1000-X, the temperature difference shall be no more than 13.9°F.

The waiting time between filling the tank and the start of the test data collection shall be at least 6 hours for the Alert 1000 or 1050 and 1 hour for the Alert 1000-X or 1050-X. For the Alert 1000, the total time for data collection shall be at least 1 hour for tanks of 15,000 gallons or less and at least 2 hours for tanks over 15,000 gallons. For the Alert 1000-X, the total data collection time shall be at least 2 hours. For the Alert 1050 and 1050-X, the total time for data collection is at least 5 minutes.

Used alone, the Alert 4000 tank test system is approved for use as a method of tank tightness testing specified in **s. COMM 10.61 (3)** for tanks that are 95 percent full, but not overfilled, during the test period.

The Alert 4000 system may be combined with the Alert 1050 or 1050-X ullage test system, or other approved ullage test system, to test tanks that are at least 20 percent full. When an ullage test is used to test the portions of the tank that were above product level during the Alert 4000 test, combined systems meet the requirements of **s. COMM 10.61 (3)**.

The alert 4000 is approved for use with tank sizes no larger than 15,000 gallons.

The tank shall be 20 to 95 percent full during the entire test period. Within these product levels, product may be dispensed form the tank during the test, but may not be added to the tank.

There is no required waiting time between adding product to the tank and the start of test data collection. The total time for data collection shall be at least 24 hours. Testing is conducted while the tank is on operation. A minimum of two hours of non-operation time per 24-hour period is required for a valid test.

All installation, testing and maintenance of this system shall be performed in accordance with the manufacturer's recommendation and all applicable codes. In addition, a qualified technician shall conduct all necessary maintenance and calibration procedures as recommended by the manufacturer to assure continued and proper operation of the system. Inspection must be conducted annually by a qualified technician and all respective documents maintained on site.

This approval will be valid through December 31, 2005, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The Wisconsin Material Approval Number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The Department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Reviewed by: _____

Ahmed Ghalib,
Code Consultant

Approval Date: _____

Approved by: _____